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Twenty Years of Glassmaking

By S. R. Scholes [1]

THERE is a lull in the manufacturing activity that usually characterizes America. We do not accept this lull as more than a temporary halt for the correction of some faults—we cannot quite name them—in our economic program.

At such a time, it should be of interest to look back for two decades and review the changes that have taken place in the glass industry. While these years are included in the time many of us have worked with glass, and constitute no lengthy period in the life of a nation, they have witnessed tremendous changes in our industry. To recite some of these changes may encourage us to believe that developments and improvements of equal magnitude and value can be accomplished in the next twenty years.

Such a contemplation may well begin with raw materials. Laboratory testing being much more common, it is safe to say that the purity of glass-making chemicals is at a higher standard. The large producers of sand confidently announce iron oxide below .025 per cent, knowing that their product is being checked by numbers of users. More attention is being paid, also, to the screen analysis of sand and feldspar, and it is no longer necessary to accept without choice the grindings offered.

Soda ash of 1911 would probably be sent back by the glass company of 1931. It would be too dusty and unmanageable. In its place we have a product that corresponds to sand in its screen analysis, is practically dustless, and is moreover freer from sodium chloride than its predecessor.

The various forms of lime remain very much as they were, because the rock formations whence they come are the same deposits. Some slight improvements have been made in selecting, burning, and grinding. The precipitated carbonate now marketed and available for finer glass is in line with other modern raw materials.

Red lead remains as it was, even more reliable as to freedom from other heavy metals. But its sister oxide, litharge, has been raised to the status of a real competitor by improved methods of burning, which insure the absence of metallic lead, once the bugaboo frightening us away from it.

Glass men have been interested spectators of the contest between synthetic and Chilean nitrates. The result so far is a white, granular, easily handled niter, practically as pure as the older "double-refined," at the price of the brown, lumpy, clay-impregnated crude niter of twenty years ago.

Several of our materials, which are re-crystallized salts, having been brought to a high state of purity in the past, could not well be improved upon. Such are potash, borax, and potassium nitrate (saltpetre). However, it is noteworthy that the prices of these bear no relation to the prices they brought in 1911, in comparison with the wage levels now and then. Borax, especially, is now a cheap salt. One hour's laborer's wage will now buy 20 lbs., where it bought 5 lbs. in 1911.

A number of colorants that were laboratory curiosities not many years back, are now of great importance. Chief of these is selenium, which has so thoroughly displaced manganese as a tank-glass decolorizer, and which is responsible for the pink and ruby glasses of this age of color. Those rare earths, cerium and neodymium oxides, are now articles of commerce, and new uses for others may require their purification also in commercial quantities. Apparently the chemical manufacturers can now supply compounds of any element in the periodic system, if we can show results from its use.

Today's mixing room presents a striking contrast with older ways. Mechanical unloading, conveying, and mixing; dust-collecting systems; automatic scales;—these developments have made the compounding of batch a more human matter. The man who turned batch with a hoe, stifled by a respirator and stung from head to foot by alkali dust, in 1911, has a far happier time and turns out a better mix today.

The glass melting pot, open or covered, has undergone no essential change in twenty years. Does this mean that the ultimate design has been reached, or merely that we are patient?

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Fire-clay remains what it was, but the understanding of the changes it undergoes upon heating has recently advanced by long strides. We confidently look to the translation of this new knowledge of alumina-silica chemistry into results in glass-containers. The actual melting and casting of refractories by one concern is the most daring step in this direction in this period.

Various mechanical improvements in the preparation of the raw clay mix, formation of blocks, burning, and grinding to true shape and size, have all contributed to a better tank-block than we had before the War. The bricklayers now need to do very little chiseling and rubbing, to get plumb walls and good joints.

Each of the principal fuels used in glass manufacture requires special mention in the history of this period. Producer gas developments are probably the most striking. The hand-fed, hand-poked producer of 1911, generating a gas of variable character depending upon the skill and attention of its operators, has passed from the picture. In its place there is a gas-making machine, mechanically fed and poked, with mechanical ash-removal. The pressure of the gas is automatically controlled. Our knowledge ot coals, temperatures, blasts, flue-construction and insulation, and a number of such engineering details, has advanced greatly. Producer gas has thus become a reliable and controllable fuel.

Natural gas, after threatening to disappear as an industrial fuel about ten years ago, seems to be available in greater quantities than in 1911. Its price, however, will probably remain relatively high in the central states, because of the demand for it in the large cities to which it is piped for domestic use.

Oil is far better understood as a glass-furnace fuel than it was twenty years ago. A number of excellent burners are on the market. On the seaboard, and wherever gas-coal and natural gas are out of reach, oil is the standard fuel.

Better results from the burning of these fuels are also due in large part to better furnace design. This is especially true of tank-furnaces, where the ever-increasing speed of machine production has been met by increased melting efficiency. Whereas the melting of one ton of glass per 15 square feet of melting area was formerly good practice, the tanks of today supply better glass, and melt a ton on 8 square feet or less.

In the field of glass technology, these two decades have seen startling developments in heat-resisting, optical, and sheet glass. The vogue of color, too, has brought out a variety of tinted glasses beyond anticipation.

Pyrex, the Corning glass of high thermal endurance, has not only given chemists a glassware superior to any previously made, but it made baking dishes of glass practical, and introduced glass in a constantly increasing number of technical applications.

The War found America without an optical glass industry. The Bureau of Standards and the Geophysical Laboratory of the Carnegie Foundation, co-operating with the factories, not only produced excellent optical glass, but placed the highly specialized industry on a scientific basis. The literature of optical glass may be said to date from 1914.

Window glass practice and processes have changed so rapidly in twenty years that it is difficult for anyone outside that particular industry to keep pace with them. Hand-blown window-glass declined during this period until it vanished. The Lubbers process, regarded for a few years as the last word, seems definitely superseded.

The Colburn-Owens method for sheet glass, and the Fourcault process as developed and adapted by American engineers, now struggle with similar ways of drawing sheet glass, for possession of the field.

Needless to say, the public has been the ultimate gainer, in the quality and cheapness of window glass.

In the plate-glass industry, the advent of the closed automobile gave rise to important developments, such as continuous-pour processes. Polished plate, with its obvious advantages in clarity, now appears in residences and offices where it would have been a luxury previously out of reach.

The annealing of glassware is now accomplished by "annealing machines," whose capabilities in the control of the time and temperature factors make old-fashioned lehrs seem very crude. Also, the recognition of the residual strain allowable, or even desirable, in various types of ware, has taken place in this period.

Machines for working molten glass, and feeders to supply them, are outstanding features of these swift years. Three unskilled people, with a machine, can turn out more tumblers than three skilled glassworkers, with two or three helpers, could make in the same time twenty years ago.

The results of this mechanizing have been not altogether pleasant. Many skilled men have found themselves forced to find other means of livelihood. Under the urge of cheapness, much inferior ware has been accepted by the public. However, glass for packers' use has been made available in limitless quantities, and every household may have abundant drinking glasses.

In technology, apart from what has already been mentioned, the formation of the British Society of Glass Technology and the formation of a Glass Division in the American Ceramic Society, are events that mark this period. The work of Turner and his colleagues at Sheffield, and the work of American glass technologists stimulated by the Ceramic Society, have done much to advance the industry and its literature.

Engineers Favor Exclusive Patent Court

A single court of patent appeals which it is believed would stimulate invention and protect both the public and the patentees from large financial waste has been recommended by the patents committee of the American Engineering Council, New York, of which Edwin J. Prindle, formerly president of the New York Patent Law Association, is chairman. A bill has been prepared by Mr. Prindle providing for a court to sit at Washington which would include a Chief Justice and six associate judges to hold office during good behavior. The court would have final jurisdiction in all appeals from patent cases from the District Courts of the United States and from the Supreme Court of the District of Columbia both in interlocutory and final orders and decrees, thus abolishing the jurisdiction of the United States Circuit Court of Appeals in such cases.

Non-Structural Figures on Glass Qualify as Trade Marks

By WALDON FAWCETT

A TRADE MARK integral with the glass is not an impossibility. Thanks to a recent official ruling at the U. S. Patent Office, a feature inherent in a glass product may, under appropriate circumstances, obtain protection as a registered mark of origin. This pronouncement which came as the result of an appeal to the head of the Federal clearing house for trade marks should end the confusion and uncertainty which have prevailed in the industry for some time past in respect to the validity of glass-marks that are "at one with the goods."

This uneasiness in the industry is, in turn, a by-product of the latter-day trend to more universal and more specific identification of glasswares. The trend to trade marking, which is so conspicuous a characteristic of the times in other lines of industry, is likewise manifesting itself constructively in the glass industry. If full return is to be obtained for effort in advertising and sales promotion it is all but essential that means may be provided whereby consumers may recognize the goods and which will serve as buying clues for repeat orders.

It is only natural that the average glass manufacturer, confronted with the responsibility of identifying his wares to the trade and to the public, should be drawn to a medium physically attached to, or embodied in the goods. That this impulse is stronger in glassdom than in any other industry is attributable to the nature of the product. The glass element being what it is every consideration of convenience suggests inclusion of the mark within the form. More than that, there is the necessary solicitude for the ensemble appearance of the glass product. If a trade mark is to be indelible and endure for the full life of the article it identifies. it seems all but inevitable that origin of the goods shall be recorded by something within the unit—a badge of authenticity that shall not obscure nor deface the transparent surface of the glass.

Glass makers and marketers have, all along, been pretty well agreed as to what they wanted to identify makes of glassware. But straightway they have bumped against a prohibition which denies Federal registration to a functional feature or *a structural element* of the goods. Of course, a glass manufacturer who is willing to waive all protection save that afforded by the common law against unfair competition may go ahead and choose and use any trade mark he sees fit. But if he desires such protection as the Federal courts afford under the Trade Mark Act of 1905 he must conform to the rules of the U. S. Patent Office including the one which places a ban on structural features.

For many years past the trade mark censors at Washington have interpreted this taboo on built-in glass-marks rather literally and have applied the ban rigidly. Only within the past few months has there come a concession from this official sternness which will mean much to all glass manufacturers who may desire to brand their goods by means of bands and other expressions which may serve to label unobtrusively high grade glass products. The new and more liberal attitude at trade mark headquarters was revealed when the Commissioner of Patents overruled his subordinates and granted a registration to Louis J. Kolb of Philadelphia, doing business under the trade name of Safetee Glass Company.

The mark for which the Philadelphian so persistently sought sanction consists of a band or coating of metallic silver-like compound arranged about the perimeter of glass sheets including laminated glass sheets in the case of small sheets. The band extends slightly inward between the glass sheets and shows through the glass in the case of large laminated sheets, the fundamental feature being the silver-like band about the perimeter of the glass.

It will be understood that in this test case no claim was made to the glass object itself nor to the representation of the article of glass manufacture as a whole. That would be wholly out of reach of any trade-marker. Uncle Sam will never consent to give to any one house in the glass industry a monopoly of use of any form, symbol or identifying expression that is the common property of the industry as a whole and that must be kept open to the free use of all glass makers. Even with the application restricted to the silver-like band as it appears on the Safetee line only, the effort for registration encountered resistance in the early stages.

The U. S. Examiner of Trade Marks, who first passed upon the Kolb application, turned it down cold. He said that any glass manufacturer has the right to apply a protecting band to the edge of his glass. And as for the distinctive silver color, if the Patent Office were to grant trade marks for different colored bands it would soon exhaust all the colors available to manufacturers for protectively coating the edges of their goods. Finally, the keeper of the Trade Mark Register refused a franchise for the Kolb glass-mark because he insisted that the encircling band applied to the edge of the glass is, or well may be, a functional feature of the goods. And that damns it as a trade mark.

Unwilling to take "No" for an answer, the manufacturer of Safetee Glass, formerly known as Super Glass, appealed to the umpire higher up. It was urged on the manufacturer's behalf that the silver-like band was not a structural feature because it could be removed without in any way destroying the structure of the laminated glass. The Patent Commissioner upheld this contention. He said that the question at issue was whether the silver band on the glass had any other function than that of a trade mark. This question he answered in the negative. His official conclusion was that so long as the silver-like band or rim or coating forms no necessary part of the glass but is merely associated with the sheet of glass, it is believable that the members of the public would regard it as having no other function than that of a trade mark. Consequently the overlord at the Patent Office reversed the junior censor and this precedent-setting glass-mark has been admitted to registration—providing a pace-setter for other glass-marks of the same species.

The Manufacture of Rolled Plate

By ERNST LUTZ *

(*Continued from the June, 1931, issue*)

This work has been revised, so far as the English and the technical expressions are concerned, by F. W. Preston, who has also added a number of notes relating in general to the special conditions of American practice; but it must be understood that the opinions expressed in the text are those of Mr. Lutz, and neither the Editor nor Dr. Preston accepts responsibility for them.

WITH the dimensions of the melting pots, the casting tables and the lehr, as they have been described before, the following output of normal sized rough glass sheets, ground and cut, is obtained:

Size No.	Per Pot Per Working Day: From—to Sq. Ft.	Per Pot Per Working Day: Average Sq. Ft.	Per Annum Per Furnace (with 16 Pots and 305 Working Days) Sq. Ft.
I	226—258	237	1,157,000
II	312—334	318	1,550,000
III	355—410	377	1,830,000

Of the rough and uncut surface of the rough glass sheet, i.e., of the surface actually rolled on the casting table, about

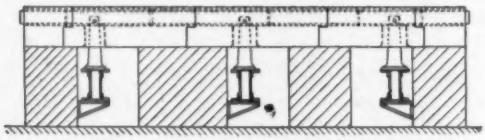

FIG. 120

20 per cent is lost in breakage, cutting of the edges and waste when eliminating faulty areas; these glass fragments are carefully collected for re-melting. Immediately after its withdrawal from the lehr, one to two inches of the edges have to be cut off, as they are most sensitive to the room temperature and always show cracks,† which easily develop further. The sharp edges produced by the cutting are chamfered off with a special tong, as otherwise they may cause new cracks. On the cutting tables the rough glass sheets are inspected for faults; if the sheet is not very transparent, electric lights are used. The main imperfections which may exist and necessitate the cutting up of the sheet into various parts, are large bubbles, caused during casting and rolling, on account of faulty teeming of the pot, or due to worn pot rims, or to inexpert spreading of the glass with the hook in front of the roll, or to dirt. Other imperfections are collections of smaller seeds on a certain area (which again are caused by dirt fallen into the glass mass or on the casting table), fragments of batch material, of fire-bricks and pot material, unmelted particles, fire and other cracks. To what an extent boil-bubbles have to be cut out, depends on the quality required for the finished sheet—generally speaking, one aims at getting the sheet as large as possible; in sheets which are used for glazing work, small bubbles are less troublesome, while sheets intended for mirrors, depending on the "choice," must be more or less free from them.

Figs. 122 and 123 show a cutting table for rough glass sheets as used today in conjunction with a lehr; for one lehr there are usually two or three tables On the left hand side of the said figures a movable table is illustrated, on which the rough glass sheets are conveyed from the lehr to the cutting tables. All of these tables are about 20″ shorter and 20″ narrower than the clear bottom width of the lehr chambers; for instance, for the above size II, casting tables of 315″ x 157½″ and travelling tables with a frame of 326″ x 170″ are commonly used In order to stand the large sheets vertically, the cutting tables can be turned round a shaft 1; for this purpose the side of the table moving downwards carries a number of claws of 2½″ to 3″ width, which grip

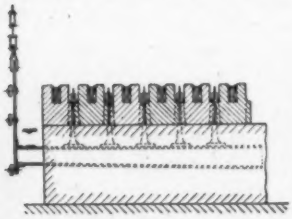

FIG. 121

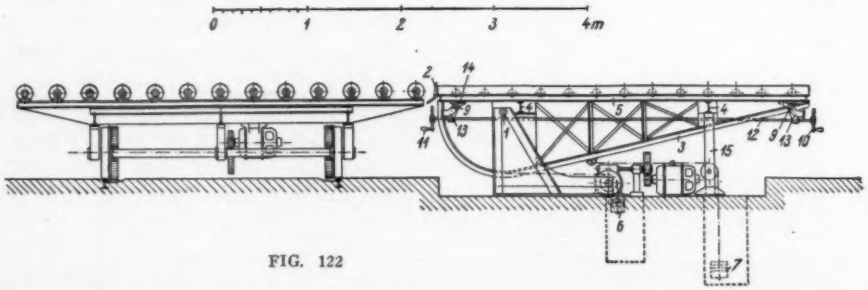

FIG. 122

the sheet. The claws can be turned, so that in the ordinary course they do not protrude over the table surface; before tipping the table over, they are put up and fixed by a lock. For one sheet two claws only must be taken; if three claws are used and the middle of them is somewhat higher than the others, the sheet would rest with the greater part of its weight on this middle one and the unfavorable distribution of the pressure might cause its breaking. The bearing surfaces of the claws are lined with felt. The frame of the cutting table consists of two girders 3, which are fixed to the shaft 1 and also connected together by two beams 4 of about 4¾″ height. On these beams 4 the table plate, which is built

* Of Desseau, Germany. This work will appear in German in the forthcoming new edition of *Dralle-Keppeler*, "Die Glasfabrikation," due very shortly.

† My experience is that the cracks are far from universal, and the real reason for trimming off a few inches is the fact that they carry a strong rim-compression, and by their removal the tensions in the remainder of the sheet are appreciably reduced.—F. W. P.

FOOTNOTE: In the Figures, originally prepared for use eventually in the coming new edition in the German language of *Dralle-Keppeler*, "Die Glasfabrikation" in 1931, dimensions are given in metres (*m*) and millimetres (*mm*). We would like to have given these in feet and inches but the translation and the making of nearly two hundred and fifty new illustrations would have involved a prohibitive loss of time and expense. To some of our readers the metric system is as familiar as the English units; for the others we may say that a metre is approximately 40 inches, and a millimetre is approximately 1/25 of an inch. A thousand millimetres, of course, go to a metre.—*F. W. P.*

up of cross-channels 5 and covered with wooden boards of 2-2½" thickness, is placed. The table is tilted by a worm wheel driven by a 3½ to 4 hp. motor; this motor is capable of bringing the table in 15 to 20 seconds in the vertical position. The weight of the table is partly balanced by counterweights 6; the weights 7 serve to return the table to its normal position with motor reversed. In its horizontal position the table is supported by 2 iron pillars 15. In the end positions the motor is switched off automatically. The rest; there are two levers 14 for each cross rod, one on the left and one on the right. Rocking the levers 14 up and down causes a corresponding movement of all cross rods 8 and of the 204-260 rubber rollers. Each lever 14 is operated from its shaft 9 by a special catch, and is otherwise loose on the shaft. If a short handle is pushed on the rear arm of these levers, each of them can evidently be moved independently. Each cross rod 8 therefore can also be individually lifted and lowered with its corresponding levers 14; this is necessary

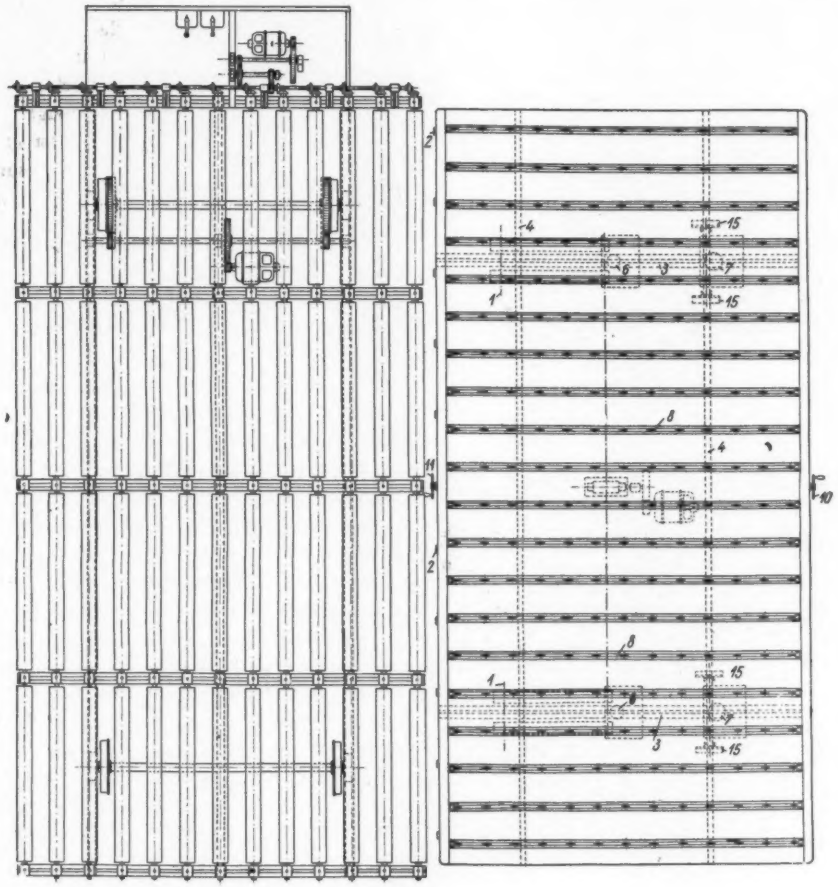

FIG. 123

rheostat placed under the table can be operated from either side of the table. The table plate is provided with about 17 to 20 cross bars 8, each of which is made up of two flat irons of 3" x ½" and which can move up and down; in between the two flat irons and at intervals of about 12" each cross rod carries 12 to 13 rubber rollers of 3½" diameter and ¾" width. With the aid of the shaft 9, all rods and with it all rubber rollers can be lifted from either side of the table with hand wheels 10 and 11 till they become level with the rolls of the travelling roller table. The spindle 12 carrying the two handles is fitted on its end with right and left hand threads; when turning the spindle two nuts are moved in opposite directions, each nut being seated in a lever 13, rigidly fixed to the shaft 9. By the turning of this shaft, the levers 14 are rocked up and down; these levers carry at their upper ends small rollers on which cross rods 8 in order to cut the rough glass sheet to a certain section; for completing the break of the sheet along the demarcation line, the cross rod 8 situated below the said line has simply to be lifted.

As stated before, all the wooden rolls of the travelling roll table can be put simultaneously and uniformly in such a movement that the rough glass sheet lying on it is pushed sideways. When pushing a sheet from the roll table on to the cutting table, the rubber rolls of the latter are brought level with the wooden rolls of the travelling roll table, and by rotating the wooden rolls the sheet is moved on to the rubber rolls of the cutting table. At the moment the sheet lies fully on the cutting table, the vulcanite rollers are lowered beneath the surface of the table plate, so that the sheet rests on the wooden deck. The wooden rollers of the travelling table have a diameter of 6½"; they are keyed on a dozen or more

shafts of 1½" diameter, running up the longitudinal direction of the table; these shafts are driven at their one end through bevel wheels and gears by an electric motor of 2 hp.; the wooden rolls are able to make up to 60 revolutions per minute. For conveying the roller table from the lehr exit to the cutting tables and back, an electric motor of 3 hp. is provided which imparts a velocity of up to 200 feet per minute. The driver's stand for operating the two motors is at A and consists of a frame reaching almost down to the floor and also carrying the motor for rotating the rollers; the current is fed from an underground main or through a flexible cable which winds and unwinds itself automatically on a drum.

The work on the cutting table and the removal of the squarely cut plates must keep step with the casting of the sheets, their movement in the lehr and their withdrawal from same; every 6 to 10 minutes, or, as was calculated above, on an average every 7½ minutes, one of the cutting tables must be free for a new sheet. The *small* sheets are carried by hand to the rough glass racks or to the grinding shop; or they may be conveyed with small trucks on narrow gauge rails; the *large* sheets were formerly carried by 4 to 8 men, 2 to 4 on each side, with the aid of straps; today the sheets standing on the tipped-up cutting-table are gripped by special tongs (Figs. 166-173 [to appear later]), which are suspended on travelling cranes. These travelling cranes should

FIG. 124

be able to move if possible over the whole rough glass store, and, depending on the position of the grinding shop, should also be able to move to laying berths.

Fig. 124 shows a rough glass cutting shop; on the right, the end of a lehr can be seen from which a sheet is just being withdrawn. In the foreground a cutting table is in horizontal position while in the background one in vertical position is visible. On the left a truck running on rails is conveying rough glass to the rough glass racks and to the place where the sheets are laid for grinding. In this case both rough glass-store and laying berths are at some distance. The whole shop is within reach of a travelling crane of 2,500 to 4,500 lbs. capacity and fitted with lifting clamps.

THE GRINDING AND POLISHING OF THE ROUGH GLASS

The process of grinding must remove the rough and opaque surface layers on either side of the sheet and make the surface so smooth, that with the apparatus and means available for polishing, a perfect transparency and a faultless surface, everywhere clean and uniform, is produced as easily and as cheaply as possible. Today sand, emery and the like are almost exclusively used for the grinding, the grains working between iron "runner bars" or plates and the glass. In this way the grains produce an enormous number of small scratches, cavities and pits in the surface of the glass. In this process the grains themselves are crushed, as they are softer* than the glass. The sharper and larger the grain, the deeper the grooves are cut; a certain size of grain must however not be exceeded, as above this limit the cutting power of the grains becomes smaller and the danger of crushing the glass sheets increases. Depending on the hardness of the grains, a size from .030" up to .050", is chosen for the first stage of the grinding. As soon as this rough grinding has removed the outermost glass skin, the operator gradually changes to finer and finer grains until the glass surface is so smooth that the polishing machines are able to accomplish their purpose.

At this stage the glass surface feels *soapy* and it is for this reason that the French call the finish-grinding "savonner,"† The surface thus produced is still opaque and when viewed in the microscope still appears covered with small pits reflecting the light; these small cavities are furthermore covered with very fine glass slivers and abrasive grains which would not be freed by simply washing or rubbing. Only by systematic polishing is the glass surface completely changed, so that, practically speaking, the light passes without any scattering.

There are a number of theories as to what actually happens during the polishing. One of them contends that the polishing is simply a continuation of the grinding, i.e., simply a finer form of grinding. According to another theory the outermost glass skin during the polishing softens so much that it is smoothed out like a paste; still a third theory says that at the beginning of polishing the state of affairs is characterized by the first mentioned theory, while towards the close of the polishing the process is rather that claimed by the second one. It is anyhow a fact that even the polishing removes glass from the surface, because glass is found in the polishing felts and in the residues of the rouge; also the glass sheet itself loses in weight by the polishing.

THE GRINDING AND POLISHING SHOP

The grinding and polishing shop usually adjoins the rough glass hall, so that the rough stock has to be conveyed only a short distance. If the local conditions do not allow the grinding shop to be attached immediately to the rough glass hall, the sheets have to be brought along on special trucks; these trucks have to be well sprung and their rails to be well looked after, so as to avoid shocks.

Today, the rough glass—especially if sheets of big and small sizes are to be treated at the same time—is still frequently ground and polished by being put on big circular tables where it is worked by special machines. The way this method has hitherto been practiced does not allow of

* This is not true according to Mob's scale of hardness. See THE GLASS INDUSTRY, April, 1930, p. 79.—F. W. P.

† Literally, "soaping."

continuous production. Therefore efforts are being directed to making the work more continuous. Very good results have already been achieved so far as the treatment of rough glass sheets of the same dimensions is concerned. The devices set up for such work have already been applied to the simultaneous treatment of rough glass sheets of various dimensions. For the time being, however, for various reasons, they are not yet in general use though one may anticipate that it will come to pass as time goes on.

A survey may be given showing the old method with the circular embedding basis of grinding and polishing:

In the laying shop the rough glass sheets are embedded in plaster on large circular iron decks which run on rails. These tables usually have a diameter of 23 to 33 feet.* The grinding tables are then pushed into the grinding apparatus with the aid of a transfer table and electric capstans; therein the surface of the embedded sheets is ground plane with grinding discs or "runners," fed with sand and water; the runners are faced with cast iron "runner-bars." The sand, when used up and pulverized by the grinding process is again collected and washed in long channels, in boxes, or in special washing machinery, and graded again according to grain size and then used for the fine-grinding. In this washing it is important to prevent the sharper grains of the preceding stages from mixing with the finer one following.

When the surfaces of the embedded sheets have been ground plane and no specks of the rough skin are left, the fine grinding begins. For this purpose, depending on experience and the custom of the various factories and on the nature of the original grinding sand, 2 to 6 various grain sizes, obtained by the washing process, are selected; first the coarsest and finally the finest grain is taken, so that the surface gets finer and finer. Following the finest sand the "smoothing" is continued for some minutes with very fine pulverized emery, which like the later sands, has been ground very carefully and mixed with water. The emery also, is subdivided into 2 or 3 grades; this is done with hair sieves† of which the finest is so close that the emery washed through it, when taken between the fingers, feels like soap; the feel of the actual grain must disappear.

After this work, the surface of the sheet is still "blind" and opaque. Lustre and transparency are only obtained with the later polishing, done in special polishing apparatus. The finer the emery-smoothing is done, the better and more quickly will the polishing proceed and the more perfect and shining will be the surface of the glass. The "smoothing" proper requires great care, and, before it is started, the grinding discs and all parts of the grinding apparatus which are situated above the grinding table must be carefully washed off with water, to remove the danger of belated falling of sharp sand grains onto the glass surface, which of course would again produce scratches. Such scratches cannot as a rule be gotten rid of by the smooth grinding which follows. It is advisable to wash off before using fine sand and against before turning to emery.

Depending on the flatness of the embedded sheets, on the sharpness of the grinding sand available and on the efficiency of the sand washing, the grinding and fine grinding of one side of the embedded sheet today takes about 1 to 1¾ hours; to this must be added the time required for conveying and removing the grinding table to and from the grinding apparatus. It can be assumed that every one hour and twenty minutes the grinding apparatus grinds one side of the embedded sheet, i.e., with day and night shifts the apparatus grinds and smooth grinds 18 to 20 glass sides in 24 hours, which means 9 settings on either side. In some factories these figures have been improved appreciably, but very often at the cost of a poorer fine grinding, so that afterwards the polishing takes all the longer or the result will not be of the same standard.

Shortcomings in the smooth grinding cannot be completely removed by polishing. For thin plate glass sometimes special apparatus is used with small table diameters; this apparatus, for various reasons, works somewhat more quickly than the larger ones used for sheets of standard thickness.

After completion of the fine grinding, the table is withdrawn from the grinding apparatus and pushed into a polishing apparatus. The polishing is done in a similar way to the grinding; in place of the grinding discs there are polishing plates of felt and as means for polishing the so-called "rouge" (oxide of iron) is used, which is pulverized, sieved and mixed with water. Before the grinding table is inserted into the polishing apparatus the embedding of the sheets must be carefully inspected. It must be investigated whether the individual sheets still sit tightly in the plaster and whether crevices have formed between the sheets, in which sand or emery particles have collected. Further, it must be examined as to whether or not during grinding, small glass splinters have come off and embedded themselves in the plaster. Above all, the edges of the sheets have to be inspected because they may have become so chipped, that during polishing small splinters might come off, which would spoil the sheet surface; if required the edges have to be freed from plaster and rounded off; the gap of course has to be filled up again with fresh plaster.* The polishing felts also must be inspected to see if they carry glass splinters from the preceding table. Immediately before the polishing proper, the table surface and the polishing blocks have to be amply sprayed with water. During the polishing process the polishing felts become "greasy" and it may also happen that the rouge becomes caked here and there by the great heat of the friction between felt and glass. In consequence, a washing with water before the rouge is used has great influence on the quick obtaining of a good polish, though it may seem at first sight a waste of time. Without washing, the polishing with "greasy" felts would take more time, and a perfect polish could hardly be obtained. Depending on the quality of the fine grinding and on the design of the polishing apparatus, the polishing takes about 1-1½ hours. With the modern quick working machines it can be reckoned that the polishing, inclusive of insertion and withdrawal of the tables and the inspection of the polishing blocks before the

* 25 to 36 ft. in America.—F. W. P.

† Sieving is not used in America, even for spectacle lenses. Careful settling and resettling in water is the rule.—F. W. P.

* In American practice the plaster joints are in all cases raked out and refilled with clean plaster. The process is known as "jointing."—F. W. P.

table is inserted, takes about the same, or only a little longer, time than the grinding and fine grinding.§

When one side of the sheets is polished, they have to be turned over so that the other side faces upwards. The polished side, which is now lying below, is no longer embedded in plaster, but laid on good strong flannel cloths, which are wetted and tightly stretched out on the iron plate of the table†; only the clearances in between the various sheets are filled with plaster. If embedded in plaster the polished underside of the sheet would suffer both from chemical and mechanical influences; but apart from this, flannel cloths are more economical, as they can be used a number of times, while plaster must be thrown away after one "run."

When the second surface of the sheet is also finished, ground and polished, the sheets are removed from the table, washed and cleaned and inspected as to quality; imperfect sheets must be cut up. As mentioned before, the general practice is to aim at producing sheets as large as possible. The smaller sizes are sorted to the standard "choices" and the same is done with the smaller sheets obtained when large ones have to be cut up on account of gross imperfections.

Fig. 125 shows schematically the layout of a grinding shop with all auxiliary requirements; it is assumed that current from a power station is available for driving the grinding and polishing apparatus, transfer table, etc., and also for the lighting; a special boiler and machine house are therefore not required. The figure shows 3 grinding machines I, II and III and 3 polishing machines IV, V and VI, which must be able to cope with the output of the 3 grinding apparatus: a, represents the rough glass store which is accessible to two electric cranes, b, gripping the rough glass sheets with clamps. One of these two cranes serves for conveying the sheets, coming from the lehr and cutting tables, into the rough glass store, while the other one is employed for bringing the sheets selected for grinding and polishing to the laying berths, c. In small factories one crane suffices; in larger ones, however, two are required, as one of them is so much tied up with the transport of the sheets coming from the cutting tables, that it cannot properly serve the laying department at the same time; this is all the more so, as it is not expedient to bring the rough glass sheets immediately from the cutting table to the laying yard, because

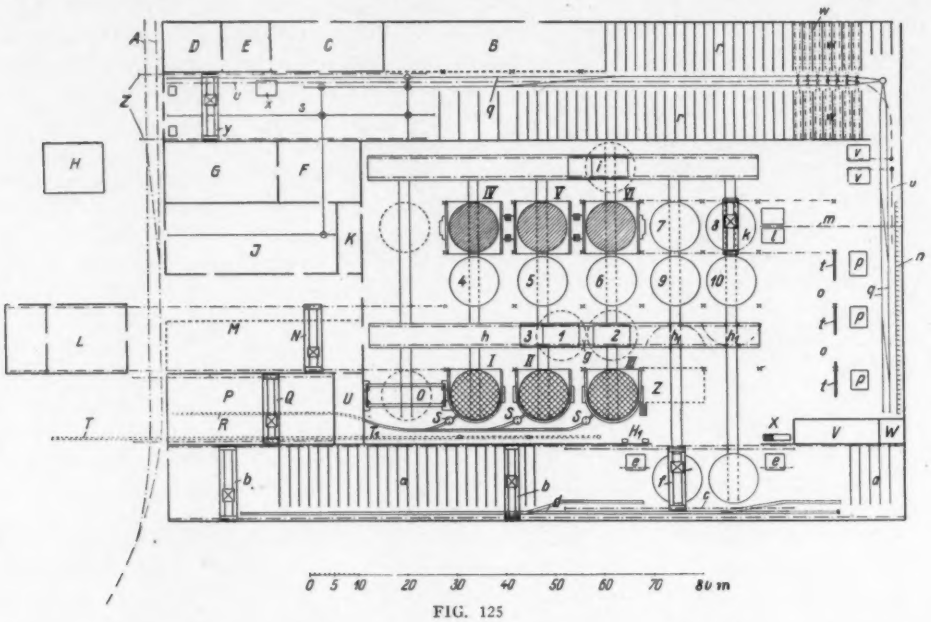

FIG. 125

they are usually still rather warm and might crack when coming in contact with the plaster or the iron deck of the grinding table.* Smaller rough glass sheets are conveyed either by hand or with a narrow gauge truck, d, to the laying department. The large sheets conveyed by one of the two cranes, b, are put against one of the vertically arranged tip-tables, e, and thus turned into a horizontal position. Another electrically operated travelling crane, f, is fitted with an air suction-pump and a number of rubber sealed suckers, constituting a "vacuum-frame." With these suckers the sheet lying on the horizontal tip-table can be lifted and conveyed to the grinding table where it is carefully lowered on to it. The rails of this suction crane are beneath the cranes, b, and the latter can travel over it. From the laying shop the tables are brought to the grinding machines by means of an electrically operated transfer table, g; this latter is fitted with a capstan for pulling the tables, and runs in a pit, h, of the grinding shop floor, so that the rails which it is carrying are flush with those on the floor.

The transfer table, g, is also fitted with two frames 1 and 2, connected to each other; two tables can thus be picked up simultaneously; for instance, the frame 1 may be charged with a table carrying fresh rough glass sheets and then, with the transfer table, may move in front of a grinding machine, for instance, 3. In this position it must wait a moment

† Plaster is the rule in America.—F. W. P.

§ In America the polishing takes less time than the grinding, as a rule.—F. W. P.

* Curiously enough, in our high-speed America, a little extra warmth in the plates might be an advantage, as cold plates have often been cracked by being laid on a deck still warm from polishing its previous "set" of glass.—F. W. P.

until the table still in the grinding machine is finished, when it can be pulled on to the frame 2. With the two tables the transfer table has now to be moved somewhat to the right hand, so that the table on frame 1 can be inserted at once into the grinding machine. With the arrangement of two table frames the finished deck may be set aside and a freshly charged one fetched at leisure; the stoppage of the grinding machine between the working of two tables is thereby cut to a minimum. The finished table withdrawn from the grinding apparatus is put on one of the three places 4, 5 or 6 in front of the polishing apparatus; generally speaking, of the said three places, that one will be free whose polishing machine will first finish its run. The driver's stand, the drive itself and the capstan of the traverse table are placed at 3; the hauling rope coming from the capstan is led to the table by means of grooved pulleys; in place of the capstan and rope sometimes small electric locomotives are employed, which run on special narrow gauge rails set midway between the table rails; the transfer table in this case is provided with an extension for the locomotive, so that the latter can run on to it and be moved about like the tables. [This extension, as well as the narrow gauge rails, is not shown in the figure.] If, for instance, a table from the frame 2 must be brought to the grinding apparatus III by such a locomotive, it is first put down by a transfer table g on to the narrow gauge rails in between the table rails in front of the polishing machine VI and the place 6; it is then so placed that the table standing on the frame 2 is immediately in front of the grinding apparatus III. The locomotive standing behind the table now pushes same into the grinding apparatus by traveling across the frame 2, it then returns to the transfer table to be conveyed to other places.

If a polishing machine has finished its work, the table is withdrawn backwards by a second transfer table i and brought to the place 7 or 8; meanwhile the felts of this polishing apparatus are inspected for glass splinters and wear and tear. In the ordinary way this work will fill the time until the transfer table i has been moved behind the polishing machine in order to pull into the machine the unpolished table standing in front of it. If one deck is now polished on the first side, and standing, for example, on place 7, there must at the same time be on place 8 an empty table covered with flannel cloths, so that the sheets removed from table 7 can be put on table 8 with the polished side downwards and the rough side upwards.

For the removing, or rather turning over of the large sheets a suction crane k and a double tip-table 1 are employed; the vacuum frame of the crane k attaches itself to a large sheet lying with the polished side upwards at place 7 and lifts it until the sheet can be brought in horizontal position to one of the two halves of the tipping-table 1. The crane k then lowers the sheet on to this table and moves aside. Both halves of this table are now swung into a vertical position and the sheet is taken up by the other half. After that, the table is opened again and both parts turned down in a horizontal position. The polished side of the sheet is now facing downwards and the rough side upwards; it is lifted again by the suction crane and lowered on the grinding table 8. In this way all large sheets are brought from 7 to 8, and at the same time are turned over. The table standing at 8 is pulled on to place 10, prepared for the grinding of the second surface, whence it is conveyed to one of the three grinding machines with the traverse table g.

If the table withdrawn by the transter table i from the polishing apparatus carries glass finished on both sides, it will be conveyed to the place 8. The large plate glass sheets are again stood on edge with the aid of the suction crane k and the tipping-table 1. Then a trolley running on overhead rails m carries them to the inspection room n. The rails m are at such a height that the suction crane is not obstructed in its movement. The smaller sheets are carried by hand to the cleaning room o, where they are hosed down with water and subsequently rubbed dry with cloth and fine pulverized pumice-stone, which must on no account contain sharp grains; if required, a little muriatic acid* is added to the washing water. As soon as the large sheets have been taken down from the table standing at 8, the latter is pulled to the place 10, so that 8 becomes free for the next table and the rest of the smaller sheets can be put down in the cleaning room o. After cleaning, the smaller sheets also are taken into the inspection room n in order to be examined for defects and be sorted according to quality. Depending on the result of the inspection, the smaller sheets are cut on the stationary table p, which is covered with thick cloth or felt, or they are immediately conveyed to the glass store r or to the packing room s on narrow gauge rails q. The protection walls t of about 7′ height and consisting of light brick work, wood or rough plate glass, and which separate the inspection room from the cleaning room o, to save the cutting tables from being splashed. The large sheets may be put down in the inspection room by the suspension trolley to be cleaned and inspected, and taken up again by a second suspension trolley u, or alternatively, the trolley m joins the trolley u and the sheets may be washed, cleaned and inspected in the suspended position. Those large sheets which must be cut up are brought to the cutting tables v, which are tiltable; the other sheets go to the store w or to the packing room s. The cases for the large sheets are placed vertically with a tipping table x and the sheets are then lowered into them directly from the suspension trolley u. For the stuffing of the cases with hay or excelsior and for the nailing or screwing down of their lids the tip-table x is lowered again; for loading up or storing, the case is turned on end and then picked up with ropes by an electric traveling crane y. The rails of this crane extend over the two railroad tracks so that the cases can be placed immediately into the open gondolas.

* Muriatic acid is present and pumice absent in American plants.—F. W. P.

(*To be continued*)

Synchronization of Two or More Motors. Developed by the General Electric Company. The speed of two or more non-synchronous electric motors can now be maintained by means of a new control mechanism. A single manual control equipment governs the two direct current motors. Application of this principle has been made in a cement plant in Pennsylvania, where it maintains the feed of raw material exactly in proportion to the speed of the kiln.

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CONTENTS

	Page
Twenty Years of Glassmaking	141
Engineers Favor Exclusive Patent Court	142
Non-Structural Figures on Glass as Trade Marks	143
The Manufacture of Rolled Plate	144
Editorial:	
On Price-Fixing	150
A Very Exclusive Country	151
Urges Free Entry for Art Glass	151
Materials and Equipment Division at Asbury Park	152
Overhead Costs Affected by Plant Layout	153
General Electric Flexible Heating Unit for Glass Lehrs	153
Crystal City Glass Works Fifty Years Ago and Now	153
Glass from Slag	153
Recent Patents	154
Libbey-Owens Takes Over National Plate Plants	155
The Challenge of 1931	155
The Glass World and What It Is Doing:	
Canadian Tariff Changes	156
Merger of Abrasive Manufacturers	156
Dupont Enlarging Buffalo Plant	157
Owens-Illinois Has Alameda Option	157
Ask Reduced Import Duties on Crude Feldspar	157
Inquiries Received	157
Coming Meetings	157
What the World Wants	157
Readers' Wants and Offers	157
Current Prices of Glass-Making Materials	158
Monthly Summary of U. S. Foreign Commerce in Glass	158

CLASSIFIED BUYERS' GUIDE, PAGE 16

INDEX TO ADVERTISEMENTS, PAGE 18

Reference to the contents of earlier issues of THE GLASS INDUSTRY can be found in THE INDUSTRIAL ARTS INDEX in many Public and Technical Libraries.

On Price-Fixing

ON no subject has the policy of the United States Government been more uncertain than its position in the matter of combinations or associations of manufacturers for their mutual benefit. It is a long way from the early interpretations of the Sherman Anti-Trust Act to the present attitude. The Government's policy has varied from administration to administration and, indeed, from the regime of one attorney-general to the next.

We are reminded, however, that even under the liberal interpretations allowed for example, by Attorney-General Donovan during the Coolidge regime, the activities of manufacturers were still circumscribed, while labor unions were permitted without question to associate themselves and fix prices for their labor.

Doubtless we may assume that the Government, in the interest of working humanity will never attempt to prevent labor unions from fixing prices for their labor. Yet it is patently absurd that one group of individuals in the commercial world should be permitted to fix prices, whereas another group should not. Accordingly, the mutual interests of labor and the manufacturer would be better served if the Government would also permit association of manufacturers for the purpose of fixing prices for the products of labor, for, under the law of supply and demand, the labor union, in its ultimate point of view, realizes that it cannot enforce wage scales which are too high to permit the manufacturer to make a profit.

So long as labor is permitted the privilege of price fixing while the manufacturer is not, the latter cannot be censored for a leaning toward wage-cutting in times of distress. Moreover, there is no denial of labor's interest in legitimate negotiation by associations of manufacturers for fixing prices, wherein there may be assured to labor its due return.

The present law, in its various interpretations, has been based on what, from time to time, lawmakers and the courts have conceived to be for the public interest and welfare. In addition to this regard for public policy there has been the assumption that economic law will ultimately remove those factories that are poorly managed. The fact is, however, that the economic law generally requires decades instead of a reasonable time to bring about an equilibrium. A frequent result is that strong concerns are carried down with the weak, and in such cases with much attendant loss and suffering which might be avoided. It is a striking fact, probably an outgrowth of our banking and industrial system, that losing and dying concerns are often carried along for years, generally by banks which, to protect their interests, throw good money after bad and encourage the manufacturer to hang on in the hope that in some period of prosperity the bank loans may be repaid. As a consequence, the economic law has been no less a failure than Government regulation of these elements of price-fixing.

It will not be surprising if, in the more enlightened relations of capital and labor, we shall see labor lending aid to capital in its attempts to obtain favorable legislation on matters of business conduct. Indeed, in all fairness, it should be pointed out that the labor organizations were

potent forces in achieving for the manufacturers much of the tariff protection which was obtained during the present administration. It would not be inconsistent for capital and labor to join forces in a move to legalize means by which manufacturers could arrive at a better degree of stabilization of prices for the products of labor. The results would be beneficial to both.—D. E. S.

A Very Exclusive Country

THERE is a land renowned the world over; its civilization is the highest and haughtiest in the world. The land is sufficient unto itself, in the opinion of its inhabitants. Immigrants are not wanted, and neither foreigners nor foreign goods can get across its frontiers without a great deal of fuss. The principal diversion of its inhabitants lies in keeping foreigners out, for they live in mortal dread of having their standard of living lowered, their morals depraved, or their institutions undermined by the dreadful alien.

Outsiders who have seen the country do not think so much of it. They say its civilization is over-rated. The country is said to possess a great deal of gold, with which the inhabitants do not know what to do. They do not want to use it for foreign trade, or for any trade; in fact trade is quite stagnant there. Its people are a religious, God-fearing race, and books on evolution are not encouraged, but outsiders doubt if that really helps the country. There are many institutions of learning throughout the land; probably no land has so many; but liberal ideas are not encouraged in any of them.

The people are very proud, but also poor. A large part of the time there is nothing for them to do; with trade stagnant, very little manufacturing can go on. And since the country will not permit imports, it is unable to develop exports. Outsiders think, or for ulterior motives pretend to think, that the country would be better off if it were less exclusive, if it would not close its frontiers too tightly against foreign goods, its places of learning to liberal ideas, and if it would permit free entry of reasonably educated and skilled foreigners.

But such sentiments of course are the sentiments of foreigners, and therefore of enemies.

The country's name is Tibet.

Urges Free Entry for Art Glass

At the annual meeting of the Glass Division of the American Ceramic Society at Cleveland, O., in February, 1931, a paper was presented by Prof. Alexander Silverman of the University of Pittsburgh on "Desirable Tariff Revision Concerning Original Works of Art in Glass." This address was published in the bulletin of the American Ceramic Society, volume 10, number 6, June, 1931, and reprints have been issued.

In his introduction, Professor Silverman points out that numerous original works of modern art in glass are imported annually into the United States by museums and other institutions under the duty-free exhibition bond which guarantees permanent exhibition to the public by the importing institution and the payment of duty and penalties to the United States government for violation of the agreement signed when the articles are released by the United States custom officials. This arrangement fully cares for such institutions. Antiques are already covered in the tariff which permits the duty-free importation of any article that is over 100 years old. The author's recommendations therefore are confined to modern works of art—articles made within the past 100 years.

Paragraph 1807 of the tariff act of 1930 details numerous objects of art which are admitted free. Paragraph 1547 covers works of art including painting, sculpture, etchings, engravings, drawings, textile designs, etc., which are subject to 20% ad valorem. This duty has been applied occasionally to original works of art in the glass field which have been imported. A case is cited in which sculptures produced by the French artist Gallé on glass which is still soft may be classified as works of art and taxed at 15% ad valorem instead of being subject to the normal duty of 45%. This was in 1924. The decision of today would place such articles under paragraph 1547 of the tariff act of 1930. A Treasury decision is quoted applying to vitrified ware in the form of vases ornamental in character, not articles of utility, the productions of professional artists upon which original paintings in mineral by the artists themselves are to be regarded for tariff purposes as original paintings in mineral and so classifiable under the free list provision of paragraph 1704, tariff act of 1922.

The writer clearly understands that artistic glass is produced in America and that where articles which are to be imported in competition with products of American manufacture, an adequate protective tariff should be in force. This type of production, however, is limited to very few American factories which would not suffer through the duty-free imports of articles of the type listed in eleven numbered paragraphs by the author and who recommended that the Glass Division of the American Ceramic Society pass a resolution asking for its approval by the Board of Trustees and then submit the resolution to the Commissioner of Customs, Washington, D. C., for suitable action by the proper legislative body or bodies, whose duties include consideration of such matters. The author's recommendations are reproduced below. It was agreed at the February 24, 1931, session of the Glass Division that the American Ceramic Society should take all necessary steps to obtain such legislation.

Professor Silverman was appointed chairman of the committee to take this matter up with the proper authorities in an attempt to get favorable Congressional action at the earliest possible date.

RECOMMENDATIONS

(1) Original oil or mineral paintings on plain, mottled, or cased glass whether unfired or fired.
(2) Original enamels on plain, mottled, or cased glass whether applied and fired for normal enamel effects or enamels which have penetrated the glass for the production of two-tone effects, smooth or rough; or underglaze paintings or enamels, *viz.*, those which have been applied to the glass, fired in, and then coated with a subsequently applied coat of transparent enamel.
(3) Original design on plain, mottled, or cased glass made with instruments harder than the glass itself, *e.g.*, the diamond point, tungsten carbide, etc.
(4) Original etchings on plain, mottled, or cased glass whether produced with acids alone or by these in combination with painting, engraving, enameling, sculpturing, etc.
(5) Original sculptures whether produced by tooling a mass of plain, mottled, or cased glass, cold or hot, or by producing a model of some other material from which a mold is prepared in which an original and not more than two replicas or reproductions are produced.
(6) Artistic designs produced on glass, plain, mottled, or cased, by applying small bits of colored glass to the hot gather and rewarming or firing to firmly affix the design to the glass object.
(7) Artistic designs produced by laying small bits of glass on a refractory mass, melting the design in a furnace and gathering it on a hot bubble or other mass of glass, subsequently warming-in or firing the mass so that the design becomes firmly affixed.
(8) Artistic models or masses of glass which shall be imbedded in other glass by subsequent dipping or rolling in the other glass. This refers to artistic cores in candlesticks, etc.
(9) The artistic laying together of small bits of glass rod, plain or multicolored, for the production of unusual millefiori effects or the production of exceptionally artistic designs in laticino.
(10) Original engravings on plain, mottled, or cased glass whether produced alone or in combination with effects described in the preceding paragraphs..
(11) Artistic effects produced with transparent enamels or soft glasses which are melted into the interstices in filigree or perforated metal objects.

Materials and Equipment Division at Asbury Park

The newly formed Division of the American Ceramic Society, known as the Materials and Equipment Division, held a divisional meeting at Asbury Park,, N. J., on Thursday, June 11, 1931, for the purpose of completing the organization of this Division and to plan for the general meeting of the American Ceramic Society to be held at the Willard Hotel in Washington, D. C., on February 7 to 11, 1932.

The meeting was called to order by Chairman L. E. Riddle, Jr. Mr. Riddle pointed out very briefly the aims and purposes of this Division and asked Ross C. Purdy, General Secretary of the American Ceramic Society, to outline the procedure and to outline the functions of the new Division in so far as they relate to the American Ceramic Society at large.

The minutes of the previous meeting held at Cleveland, Ohio, last February and the report of the Standing Committees were read and approved.

Professor George H. Brown in rendering his report as Chairman of the Committee on Education stressed rather clearly that steps should be taken to develop new uses for ceramic materials and equipment. He suggested broader courses of instruction for ceramic students. He also suggested a survey of the equipment at the various ceramic schools with an idea of adding new and up-to-date equipment for the benefit of the ceramic students.

G. T. Stowe represented the Ways and Means Committee. The By-Laws of the Materials and Equipment Division of the American Ceramic Society were read and approved with the following changes:

It was moved by C. H. Peddrick, Jr., and seconded by F. G. Lord that article VI, Section 3, be amended to read as follows:

"Five per cent of the total voting membership present at any meeting shall constitute a quorum and the majority shall rule."

It was then moved by H. F. Kleinfeldt and seconded by F. G. Lord that Peddrick's motion be reconsidered. Mr. Peddrick then moved, which was seconded by Chas. W. Crane, that article VI, Section 3, should read as follows:

"Five per cent of the total voting membership present, but not less than 15 voting members, shall constitute a quorum and the majority shall rule."

On motion by H. F. Kleinfeldt, seconded by F. G. Lord, it was moved that the publications committee be eliminated from the standing committees, as outlined in article VI. This was done for the reason that the American Ceramic Society has a committee on publications, therefore there is no necessity of having a committee on publications for the Materials and Equipment Division.

It was moved by Professor George H. Brown, seconded by F. G. Lord, that article IV, Section 1, be changed to read as follows:

"The officers shall be a Chairman, Vice-Chairman, Secretary-Treasurer, and Counsellor, elected to serve one year, or until their successors have qualified. They shall take office at the last session of the Annual meeting at which they are elected.

"SECTION 2.—The affairs of this Division shall be directed by an Executive Committee comprised of the elected Chairman, Vice-Chairman, Secretary-Treasurer, Counsellor and Trustee. The Chairman, Vice-Chairman, Secretary-Treasurer and Counsellor to serve on the Executive Committee for a period of two years after termination of their respective offices."

Sections 2, 3, 4 and 5 of article IV to be designated as Sections 3, 4, 5 and 6 respectively.

It was moved by H. F. Kleinfeldt and seconded by F. G. Lord that article VIII be changed to read as follows:

AMENDMENTS.—Amendments to these By-laws must be proposed by ten members at a regularly constituted meeting of the Division, and when approved by the Committee on Rules of the Division shall become legal when endorsed by a two-thirds vote of the members present at any Annual meeting.

It was moved by Edward P. Bailey and seconded by C. H. Peddrick, Jr. that the by-laws as adopted at this meeting be submitted to the Rules Committee of the American Ceramic Society.

Chas. H. Peddrick, Jr. was appointed Chairman of the Membership Committee in lieu of G. F. Metz who resigned.

Mr. Peddrick volunteered to accept the task of raising $1,000 or more to defray current expenses and to provide an operating fund. Mr. Peddrick did not desire to go on record as stating definitely that he can accomplish this task in connection with his duties as Chairman of the Membership Committee, but is willing to make the effort. Henry N. Hanna moved and F. G. Lord seconded that the Materials and Equipment Division accept Mr. Peddrick's proposition. The meeting was then adjourned.

Those who are already members of the new division are urged to point out to all glass and ceramic materials and equipment manufacturers and suppliers the advantage of joining this division.

Later, on this subject, C. H. Peddrick, Jr., vice-president of the United Feldspar Corporation, said: "I believe that the Materials and Equipment Division of the American Ceramic Society is a good one—in fact, I believe that it will be the paramount Division of the Society. Everybody should help to put it across." Cooperation in this respect is earnestly and sincerely solicited not only in getting new members into the division, but also in every other possible way from all who are interested in improving existing relations between the sellers and buyers of equipment and supplies and bettering trade conditions in various important ways.

Those in attendance were:—Prof. George H. Brown, Rutgers University, New Brunswick, N. J.; Prof. Richard Mills, Rutgers University, New Brunswick, N. J.; Ross C. Purdy, General Secretary, American Ceramic Society, Columbus, Ohio; G. T. Stowe, Sierra-Magnesite Co., Cleveland, Ohio; L. E. Riddle, Jr., Edgar Brothers Co., Metuchen, N. J.; L. R. W. Allison, The Ceramic Age, Newark, N. J.; Malcolm Catlin, The Ceramic Age, Newark, N. J.; G. W. Evans, The Ceramic Age, Newark, N. J.; E. B. Miller, Ceramic Industry, Chicago, Illinois; G. W. Cooper, THE GLASS INDUSTRY, New York, N. Y.; Henry N. Hanna, Seaboard Feldspar Co., Baltimore, Md.; R. H. Dufault, R&H Chemical Co., New York, N. Y.; Charles H. Peddrick, Jr., United Feldspar Corp., New York, N. Y.; Charles W. Crane, Crossman Company, Elizabeth, N. J.; V. B. Case, Paper Makers Importing Co., Easton, Pa.; George C. Crossley, United Clay Mines, Trenton, N. J.; William Chell, Perth Amboy, N. J.; F. G. Lord, Pennsylvania Pulverizing Co., Pittsburgh, Pa.; H. F. Kleinfeldt, Abbe Engineering Co., New York, N. Y.; Edward P. Bailey, National Airoil Burner Co., Philadelphia, Pa.; O. H. Garlick, Paul O. Abbe, Inc., Little Falls, N. J.; H. B. DuBois, Consolidated Feldspar Corp., East Liverpool, Ohio; W. A. Segar, Consolidated Feldspar Corp., Trenton, N. J.; V. V. Kelsey, Consolidated Feldspar Corp., Trenton, N. J.

FRIDAY'S ACTIVITIES

A number of the materials and equipment men stayed over at Asbury Park to attend the convention of the New Jersey Clay Workers Association which opened on Friday, June 12. A feature of the day was an address by F. A. Arnold of the National Broadcasting Company on the subject "This Business of Broadcasting."

Mr. Arnold outlined the development of radio broadcasting and pointed out that the industry as an industry is only ten years old, that during this period it has grown tremendously and ranks sixth in size of American industries. He told of the remarkable sale of different products after these products had been broadcasted. Such concerns as the Pepsodent Company, Cities Service, General Motors, General Electric, Westinghouse, Maxwell House Coffee and numerous others have benefited tremendously by radio advertising. He stated that there are thirty-six hours devoted daily to broadcasting, eighteen hours by the National Broadcasting Company and eighteen hours by the Columbia Broadcasting System. Thirty per cent of the total time on the air is paid for by advertisers, and 70 per cent of the time on the air is given to the public without charge by the broadcasting companies.

After Mr. Arnold's talk the meeting was thrown open to discussion and in this discussion it was developed that the American manufacturer of ceramic products, including all types of ceramics, had been more or less lax in any definite public program that would educate the American public to the type of American ceramic products and to the sale of American ceramic products.

A motion was then introduced by V. V. Kelsey, vice-president of the Consolidated Feldspar Corporation, requesting Chairman Frank W. Dinsmore of the New Jersey Clay Worker's Association to appoint a committee to cooperate with the American Ceramic Society for the purpose of planning ways and means of considering broadcasting as a means of educating the public to the use of American made ceramic products, this to include every type of ceramic manufactured article. This motion was seconded by

H. F. Kleinfeldt of the Abbe Engineering Company and unanimously passed.

Following is a complete list of the officers and committeemen for the Materials and Equipment Division of the American Ceramic Society:

CHAIRMAN: L. E. Riddle, Jr., Edgar Clay Company, Metuchen, N. J.

SECRETARY-TREASURER: V. V. Kelsey, Consolidated Feldspar Corporation, Trenton, N. J.

CHAIRMEN:

Ways and Means Committee, F. P. Nickerson, The W. S. Tyler Company, Cleveland, Ohio.

Nominating Committee, H. B. DuBois, Consolidated Feldspar Corporation, East Liverpool, Ohio.

Program and Paper Committee, F. G. Lord, Pennsylvania Pulverizing Company, Pittsburgh, Pa.

Education Committee, Prof. George H. Brown, Rutgers University, New Brunswick, N. J.

Membership Committee, C. H. Pedrick, Jr., United Feldspar Corporation, New York, N. Y.

Exhibition Committee: Robert Long, Binks Manufacturing Company, Chicago, Ill.

Publicity Committee, L. R. W. Allison, *The Ceramic Age*, Newark, N. J.

COUNSELLOR: H. F. Kleinfeldt, Abbe Engineering Company, New York, N. Y.

Overhead Costs Affected by Plant Layout

The extent to which overhead is affected by building and equipment design and layout was covered by W. J. Austin, President, The Austin Company, at the Production Conference of the American Management Association held in Rochester, N. Y., on June 1.

Mr. Austin showed how the design and construction of a building affects such overhead items as interest on investment, taxes, insurance, depreciation, maintenance, indirect labor and supervision. Everyone of these items increases in almost direct proportion to the cost of the plant. Reference was then made to the possibility of reducing the size of the plant by operating two, three or four shifts, and the consequent reduction of the unit cost of overhead.

To make it possible for manufactured parts to flow by shortest and straightest lines for assembly and completion and shipment it is necessary to reduce the number of buildings to a minimum and reduce floor areas of the building to the lowest point. It is also necessary to provide for proper lighting, ventilating, heating and air conditioning at all points within the plant so that workmen may operate at maximum efficiency.

General Electric Flexible Heating Unit for Glass Lehrs

The General Electric Company announces a new electric heating unit for glass annealing lehrs. This unit is designed to provide low initial and maintenance costs; correct heat distribution throughout the width and length of the lehr; flexibility of arrangement of the units in the lehr; ease of removal or replacement in either floor or roof, and constant resistance and simplicity of terminal arrangement.

The heating element is nickel chromium alloy ribbon arranged with ample electrical clearance on special refractory insulators attached to a heat-resisting alloy frame. The two terminals of the ribbon are reinforced and brought out at one end of the unit to a sufficient length for making connections outside the lehr.

Most of the standard units are designed for 55-volt operation, thus allowing four to be connected in series on 220-volt circuits. One type is also provided with a 44-volt rating allowing five to be connected in series on a 220-volt circuit. Units have lengths of either 38½ or 50¼ inches including the reinforced terminal extensions, for use in 36- or 48-inch lehrs. All widths are 7¼ inches and all heights are 3 1/16 inches. Kilowatt ratings are as follows: 3, 3½, 4, 6 and 7½.

A feature of the heating unit construction is the arrangement of more heating ribbon windings at each end of the unit, thus concentrating heat at these two points lying along the walls of the lehr and compensating for wall losses. Such wall losses heretofore have caused faulty anneals at the edges of conveyor belts.

Crystal City Glass Works Fifty Years Ago and Now

R. A. Miller, Technical Sales Engineer for the Pittsburgh Plate Glass Company, author of the article with the above title which appeared in the May issue, has forwarded to THE GLASS INDUSTRY the following letter from A. L. Harrington, the Company's chief electrical engineer, with the suggestion that it would be well to call our readers' attention to a couple of slight errors in the text which Mr. Harrington has pointed out in the letter reproduced herewith.

JUNE 5, 1931.

MR. R. A. MILLER
Technical Sales Engineer
Pittsburgh Plate Glass Company
Dear Sir:—

Referring to your Crystal City glass works article[1] beginning "During Mr. Clark's administration the factory was entirely rebuilt." When the writer arrived at Crystal City, Mr. Clark was no longer there, although we understood he had only left two or three months previously. Mr. Hart Chandler was in charge and only about three grinders and polishers were working, the rest being still under construction. In other words, while Mr. Clark started the job, it was a long ways from being finished.

With reference to Mr. Golightly. We never heard of Mr. Golightly until months later when as we understood he was re-established as Western Manager.

The Allis-Chalmers engine was known as a "Half Manhattan Unit" as they had built some 15 or 20 engines twice the size with twice as many cylinders, installed in the large cities of the U. S. These outfits were ordinarily rated at 7500 K. W., whereas the Crystal City was rated 3500 K. W. In a broader sense, steel mills and steamships had used still larger engines up to this time.

The reference to Diesel type engines is incorrect, as they were not of this type. One engine, namely the 1000 K. W. was first installed adjacent to the steam plant and then transferred to the sand plant location. In other words, one engine was changed once.

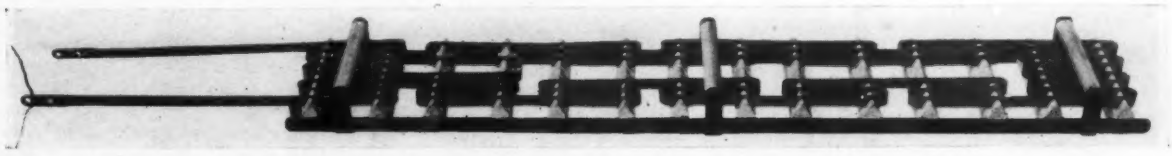
The Power Company involved is the Union Electric Light & Power Company and the high tension line was built direct from St. Louis to Crystal City. No other companies being involved.

(Signed) A. L. HARRINGTON.

[1] The GLASS INDUSTRY, May, 1931, pp. 99-102A

Glass from Slag

A news report from Auburn, Ala. states that Dr. C. A. Basore, professor of chemistry and research of the laboratories of the Alabama Polytechnic Institute, has developed a method of using Alabama sand and granulated slag from the Birmingham glass furnace districts as ingredients for the manufacture of glass.



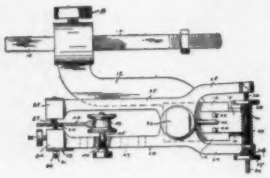
GENERAL ELECTRIC 7.5-KW., 55-VOLT HEATING UNIT FOR 48-INCH LEHR

Recent Patents

NEW INVENTIONS DESIGNED TO IMPROVE GLASS AND THE MEANS OF PRODUCING IT

Complete copies of U. S. Patent Specifications may be obtained from the Commissioner of Patents, Washington, D. C., Price 10c each

FLOATING BULB EDGE GLASS TRIMMER. U. S. 1,807,619. June 2, 1931. John A. Roush, Vincennes, Ind., assignor to Blackford Window Glass Company. Filed 7/26/29.



The primary object of the invention is to provide a trimming or cutting device that will cut sheet glass such as drawn vertically in the Fourcault process to a uniform width to have parallel sides or to remove a definite width of glass along the edges of the sheet to preserve the bulb edge therewith.

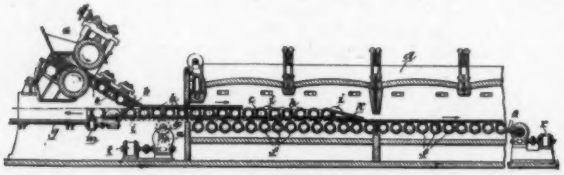
Also a trimming or cutting device that will automatically take care of inequalities in width and at the same time adjust itself automatically to any variation in thickness and surface contour in relation to a cutting tool and be extremely durable.

METHOD AND APPARATUS FOR ROLLING SHEET GLASS. U. S. 1,807,873. June 2, 1931. Joseph A. Reese and William E. Nobbe, Toledo, O., assignors to Libbey-Owens-Ford Glass Company, Toledo, Ohio. Filed 11/4/27. A receptacle containing a mass of molten glass, rolling mechanism arranged thereabove, and rotatable means for supplying a relatively large body of glass upwardly to said rolling mechanism partly under hydrostatic pressure and partly by a positive feeding action, said rolling mechanism acting to reduce the relatively large body of glass to sheet form.

GLASS-GOB DISPOSING MEANS. U. S. 1,807,336. May 26, 1931. Jeddiah B. Clark, Dunkirk, Ind. Filed 10/11/28.

FEEDING SHEET GLASS TO LEHR CONVEYORS. U. S. 1,806,590. May 26, 1931. Michael Fincke, Aix-La-Chapelle, Germany, assignor to The American Bicheroux Company. Filed 6/3/29 and in Germany 10/12/28.

By this invention the sheets as formed are fed at the speed of sheet formation directly over but out of contact with the lehr conveyor, and are then deposited thereon by a downward movement of sheet, whereby the leading end of a sheet may be lowered on the conveyor immediately behind the trailing end of the preceding sheet. The inventor prefers to effect this deposit of the sheet on the conveyor by moving the still plastic sheet from over the end of a table which at the time is moving rearwardly in respect to the feed effected by the lehr conveyor. He further proposes to accom-

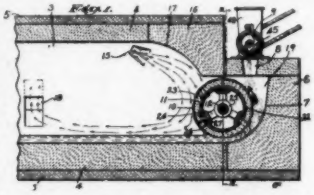


plish the change in speed of the sheet between that of formation and that of lehring, not by changing the speed of the rotation of sheet-carrying rollers, but by a bodily movement of rollers rotating at a constant speed and in a constant direction. The glass is received on these rollers from the forming machine at the speed of sheet formation, this being accomplished either by a rotation of the rollers at a peripheral speed equal to the speed of sheet formation, or by a rotation of the rollers at less speed and a movement of the rollers as a whole in the direction of movement of the sheet during formation. The sheet, after delivery to the rollers, is located above the lehr conveyor and its feed thereto is effected by a reverse motion of the rollers as a whole, the motion of the rollers as a whole at this time being equal to the difference between the peripheral speed of the rollers in question and the speed of feed lehring. This obviates the necessity for the use of a variable speed drive for the group of variable speed rollers.

METHOD OF MANUFACTURING CYLINDRICAL PLATES OF GLASS OR A SIMILAR MATERIAL FOR USE IN CONNECTION WITH POLYGRAPHIC MULTIGRAPHING APPARATUS. U. S. 1,808,442. June 2, 1931. Rudolph Weide, Berlin, Germany. Filed 9/11/29.

METHOD OF AND MEANS FOR MAKING GLASS ARTICLES. U. S. 1,807,103. May 26, 1931. William Howard Said, Corning, N. Y., assignor to Corning Glass Works, Corning, N. Y. Filed 2/21/29. The primary object is to produce articles of uniform size and weight directly from the mold and to eliminate labor and expense incident to the finishing operations ordinarily required. It is claimed that these other objects may be accomplished by the use of this invention which embodies among its features the introduction of molten glass into a mold, the introduction of an apertured glass shaping plunger into the mold, the exertion of fluid pressure on the glass through the aperture in the plunger, and the projecting of a core pin through the mold while the glass is in a molten state so as to cut off and remove any excess glass from the mold and force it against the fluid pressure into a reservoir for receiving it.

METHODS OF AND APPARATUS FOR MAKING GLASS. U. S. 1,807,054. May 26, 1931. Harold A. Wadman, Hartford, Conn., assignor to Hartford-Empire Company, Hartford, Conn. filed 11/17/28. Comprises a melting compartment in the rear end of which is mounted a suitably constructed rotary drum having a refractory surface. The walls of the compartment are so formed that a chamber practically shielded from the currents of the combustion gases is formed rearwardly of the axis of the drum. Into this chamber and onto the drum a continuous thin curtain of raw batch is fed through a suitable opening in the top of the compartment.



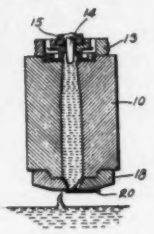
Preferably the curtain of batch strikes upon the refractory surface of the drum, which surface, during a previous portion of the revolution of the drum, has become coated with a thin coating of melted glass to which the new batch adheres.

Forwardly of the axis of the drum suitable heating means are provided for directing a flame against the surfaces of the drum as the successive portions thereof are brought to the forward position.

PROCESS FOR SEVERING COMPOSITE GLASS. U. S. 1,806,862. May 26, 1931. William Owen, Pittsburgh, Pa., assignor to Pittsburgh Plate Glass Company. Filed 7/7/28. A process of severing a composite glass plate comprising a pair of glass sheets with an interposed sheet of tough, transparent material, which consists in simultaneously cutting slots completely through the glass sheets in opposition to each other, and through a portion only of said interposed sheet, and then applying force to the two parts of the plate to rupture the thin portion of interposed material lying between the slots.

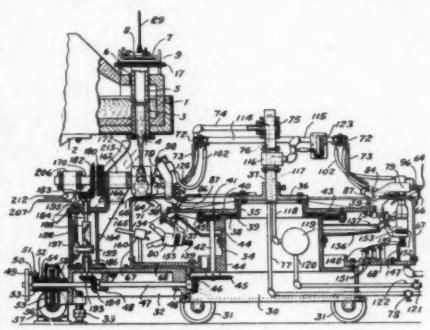
DISTRIBUTING HEAD FOR GLASSWARE FORMING MACHINES. U. S. 1,806,731. May 26, 1931. Russell G. Allen, Toledo, O., assignor to Owens-Illinois Glass Company, Toledo, O. Filed 7/30/28. Designed for directing and distributing fluids such as air under pressure and water in their passage to the different heads or units of the machine, and also for directing and conducting rarefied air as it is exhausted from the molds and other parts of the machine. The water may be used, for example, to cool the molds; and the air under different pressures for compacting the glass in the molds, blowing it to hollow form, operating air motors on the machine, etc. The rarefied air or vacuum is particularly adapted for exhausting the molds in the process of gathering glass thereinto by suction.

METHOD OF AND APPARATUS FOR GLASSWORKING. U. S. 1,791,323. Feb. 3, 1931. Karl E. Peiler, West Hartford, Conn., assignor to Hartford-Empire Company, Hartford, Conn. Filed 9/18/29. Apparatus for fabricating glass parisons comprising a parison mold for gathering a charge of glass from the surface of a gathering pool by suction, an auxiliary mold for engaging the bottom of the parison mold, after the charge is gathered, and for encircling the string of glass connecting the charge with the glass in the gathering pool, said mold having an opening formed therein which forms a continuation of the cavity in the parison mold when the molds are in engagement, a shear blade for severing the string of glass at a plane substantially coincident with the bottom of the auxiliary mold, and for covering the bottom of the opening in the auxiliary mold, a neck pin for forming an initial blowing cavity in the charge of glass, and a blow head for admitting preliminary blowing air into said cavity to enlarge said cavity and to shape the bottom of the charge in said auxiliary mold.



HOLDING MEANS FOR GLASS. U. S. 1,793,127. Feb. 17, 1931. Conrad Osius, Stettin, Germany. Filed 8/16/29. Holding means for sheets of glass in iron window frames, comprising a U-shaped resilient clip engaged over a bar of the window frame.

MANUFACTURE OF BLOWN GLASSWARE. U. S. 1,807,566. May 26, 1931. Robert W. Canfield, West Hartford, Conn., assignor to Hartford-Empire Company, Hartford, Conn. Filed 3/21/27.



This invention relates to the manufacture of blown glassware, and it has particular relation to the manufacture of electric lamp bulbs, lamp chimneys, tumblers and the like, from glass delivered in a continuous stream from the feeding outlet of an automatic glass feeding device.

The general object is to provide an improved method and an improved machine by which each article is blown in a mold while the glass in the mold is still attached to the parent body of molten glass from which it was derived.

Another object is to provide a machine in which the various mechanisms are so coordinated and arranged that the glass-fabricating instrumentalities are in almost continuous operation, thus materially decreasing the number of parts employed and simplifying the general construction of the apparatus as a whole.

More specifically, an object of the invention is to provide an improved method and an improved apparatus for forming blown glassware from a ribbon or strip of molten glass that is deposited continuously upon a support and from which the blown articles are formed by means of cooperating blowheads and molds acting upon the glass from opposite sides of the support.

It has been proposed, prior to the present invention, to carry out a general system is fabricated by flowing a ribbon or strip of glass upon a continuously advancing horizontal support and by causing portions of the glass ribbon to descend through openings in the support for engagement with blow molds that are supported and advanced beneath the support.

The invention aims to simplify and improve this system of glass manufacture by causing the ribbon or strip of glass to be deposited upon a rotary support having orifices through which the glass to form the articles is caused to descend. The support is carried by a rotary table which also carries a convenient number of blow molds below the level that receives the glass. The table also carries above the level of the glass, blowheads which cooperate with the molds to expand the glass therein. The table rotates continuously and various novel devices are provided for insuring accuracy.

A further object is to provide an improved device for imparting a preliminary configuration to the glass stream issuing from the outlet of a glass feeder, this device being adapted to overhang the table between the feeding outlet and the glass-supporting elements of the table and being quickly removable for replacement or repairs.

Libbey-Owens-Ford Takes Over National Plate Plants and Obtains 7-Year Contract for General Motors' Requirements

Announcement of what is believed to have been the largest contract ever placed at one time for a glass product in the history of the industry was made June 18 at Toledo, Ohio, when it became known that the Libbey-Owens-Ford Glass Company of that city had reached an agreement with the General Motors Corporation and subsidiaries to supply them with practically their entire requirements of glass for a period of seven years. It is estimated that the minimum requirements of General Motors under this contract will exceed $50,000,000.

In order to take care of the vast requirements of General Motors as well as those of its other customers, the Libbey-Owens-Ford Glass Company is expanding its facilities and negotiations have been completed for the purchase by Libbey-Owens-Ford of two plate glass factories at Ottawa, Illinois, belonging to National Plate Glass Company, a subsidiary of General Motors. With these new plants and its present factories at Toledo, Rossford and Lancaster, Ohio, Charleston, W. Va., and Shreveport, La., Libbey-Owens-Ford will be amply able to take care of this great increase in sales.

The properties purchased by Libbey-Owens-Ford include two complete plate glass manufacturing units known as the Illinois plant and the Federal plant. The latter, built only two years ago, employs the Bicheroux casting process and the most modern continuous grinding and polishing equipment, similar to that used by Libbey-Owens-Ford in their plant at Rossford, Ohio, acquired last year through merger with the Edward Ford Plate Glass Company. The Federal plant is now in full operation and has a capacity in excess of 20,000,000 square feet a year. In addition to these plant facilities, the Libbey-Owens-Ford Glass Company acquires valuable sand deposits on the Ottawa properties which are said to be among the finest in the country.

In commenting on the contract, President John D. Biggers said, "We have been working on these negotiations for five months and are all very happy to have concluded a mutually advantageous agreement with the General Motors and Fisher Body Corporations. The automobile industry consumes approximately 70% of all the plate glass manufactured in America. The General Motors business together with our other valued accounts places us in a very strong position. Our directors regard this as a great forward step for Libbey-Owens-Ford."

"The Challenge of 1931"

Under this head an address reviewing prevailing political and business conditions was given by E. M. Allen, president of the Mathieson Alkali Works, at the Seventh Chemical Industries Dinner held in conjunction with the 13th Chemical Exposition at the Hotel Roosevelt, New York, May 7.

Among the subjects discussed by Mr. Allen was Russia and the Soviet five year plan, taxation, and anti-trust laws. Regarding industrial problems and answering the question "What is the way out?" Mr. Allen replied that there "is no way out and never will be a way out until the American business man actively participates in the political activities of our local, state and federal government." Mr. Allen also spoke on the subject of combining all the chemical trade associations and scientific societies into one large chemical organization covering the entire country. It is certain that personal interests should not be permitted to delay the accomplishment of this object any longer.

Merger of Abrasive Manufacturers

Behr-Manning Corporation, Troy, N. Y., was recently consolidated with the Norton Company of Worcester, Mass. An exchange of Behr-Manning stock for new shares in the Norton Company was effected. The $30,000,000 business of Norton Company and the $7,000,000 business of the Troy company are united with a capital stock of $23,000,000. The Norton company specializes in grinding wheels for glass, metals, etc., and the Behr-Manning Corporation specialize in sand paper.

The Glass World and What It Is Doing

News of the Industry

Conneaut Looks for Expansion

The chamber of Commerce, Conneaut, Ohio, of which F. W. Goss is president and C. J. Dow, secretary, is making a strong bid for new industries, including that of glass manufacturing, to locate in the Conneaut district. Copies of the Chamber's latest indutsrial, comprehensive survey are available. Starting with a discussion of the importance of geographic adjustment for any industry to its natural surroundings, the factors that make for success in the location of a projected manufacturing plant are treated at sufficient length to give the readers an excellent idea of the conditions prevailing in the territory described. The various agricultural, fishing and other commercial enterprises of the district are described. Banks, churches, newspapers, schools, theatres are mentioned. Data are given on city affairs including the city government, finances, fire protection, police protection, streets and street lighting, sanitation, water supply, natural resources, population, labor and labor costs, professions, cost of living, public committees and organizations, railroads, shipping, docks and harbor, summer resorts, railroad, highway and water transportation, freight weights and fuel supplies, including natural gas.

Prospecting for natural gas in this vicinity began about 1900 in connection with an oil boom but most of the wells drilled eventually developed into sources of supply of natural gas.

Many individual wells were drilled but the supply eventually became exhausted. Recently, however, it is stated, the discovery was made that a gas pool exists which extends approximately 150 miles southerly and as far north as Lake Erie. It is believed that the development of this gas pool offers an unusual opportunity with a ready market already developed due to high prices of manufactured gas in the adjacent territory.

Other natural resources are said to be plentiful.

Canadian Tariff Changes

Proposed changes in the Canadian tariff designed to make up the deficit in the Dominion budget and to assist in the unemployment situation through increased protection to domestic industries were made provisionally effective in the Canadian Custom Houses June 2, subject to the approval of Parliament. Among the provisions affecting the glass trade is the imposition of an import duty for the first time of 35% ad valorem on laminated glass, sheet or plate and an increase to 30% ad valorem on ground feldspar. The rate on celluloid manufactures was increased to 40% ad valorem from the old rate of 35%. The rate on grinding wheels was increased from 25% ad valorem to 30%. A duty of 15 cents a pound on magazines and periodicals other than religious, educational, or scientific, is to be levied, one object of this ruling being to discourage the bringing in of publications from other countries, the character of which is not considered beneficial to the intellectual and moral development of Canadian readers, particularly the younger ones.

Roy Swain With Bethel Engineering Company

It seems that Roy E. Swain, formerly of Charleroi, Pa., during the past several months has been associated with the Bethel Engineering Company at Huntington Park, Cal.

Mr. Swain's former connection for several years with MacBeth-Evans Glass Company at Charleroi, is well remembered and previous to that engagement he was a member of the Corning Glass Works organization. However, about a year ago he resigned his Pennsylvania job, turned his back on the East and departed with his family on a motor trip to the Pacific Coast in the hope of finding a more satisfactory brand of weather for regular consumption in California.

After studying the West coast situation, Mr. Swain decided some time ago to join A. Rutledge Bethel of the Engineering company and has been working with him on the development and completion of the new "Bethelehr" recently put on the market. Several of the lehrs (described in the May, 1931, issue of THE GLASS INDUSTRY) are already in successful operation in some of the glassmaking districts of California.

As there has been no "cussing" of the Coast climate in Mr. Swain's recent communications, we assume that he has discovered the ideal place to live in and may be thinking of settling down there permanently.

Mr. Swain, by the way, utilizing his fund of knowledge gained through years of practical experience in glass feeder design and operation has prepared for publication in an early issue of THE GLASS INDUSTRY a comprehensive and interesting article on pulsating feeders.

J. W. Cruikshank Sails Away

J. W. Cruikshank, formerly consulting engineer to the glass industry at Pittsburgh, who left in January of this year for a trip 'round the world, got as far as Tahiti. Finding the South Seas Islands sufficiently interesting, an aversion to further traveling seized him, and he parked there for several months.

Having finally outstayed his leave, he returned to the States in May, and on the 24th gave a movie show to some of his friends at Pittsburgh, illustrating the life of the South Seas. Much of the photography was very good, and the accompanying lecture much enjoyed.

Mr. Cruikshank sailed on June 27th for Scotland to attend to his ancestral estate.

Passing of R. B. Cressman a Cause of Deep Regret

Widespread and deep regret has been manifested throughout the industry, particularly in the lighting glass field by the death on May 24, 1931 of Russell B. Cressman, manager of the Celestialite Division of the Gleason-Tiebout Glass Company, Brooklyn, New York. Mr. Cressman for many years was in charge of the New York Sales office of the company at 200 Fifth Avenue and had innumerable friends both in the manufacturing and distributing branches of the industry.

Over a year ago Mr. Cressman's health broke down and he spent considerable time traveling in an effort to recuperate. Eventually he put in the better part of a year on a Western ranch but while temporarily improved in health, the gain was not permanent.

From the time he entered the glass field about 20 years ago, Mr. Cressman was always devoted to the interests of the industry. Preceding the first visit to this country in 1920 of a party of 30 or 35 British glass men, under the auspices of the Society of Glass Technology with Prof. W. E. S. Turner, head of the School of Glass Technology of Sheffield as leader, Mr. Cressman responded enthusiastically to the suggestion that a suitable greeting should be arranged for the distinguished British visitors and as will be remembered, he was the organizer of the local group representing the A. C. S. Glass Division which welcomed the party on its arrival at New York. He freely took on himself practically all of the work involved in the occasion including arrangements for the dinner tendered to the guests at the Hotel Astor on the night of their arrival, September 3, 1920, a group photograph of which was published in the first issue of this paper two months later.

Mr. Cressman will be much missed by all of his friends.

Glass Journals Merge

It was announced early in May that The Glass Container magazine has merged with the Glass Packer, published in New York, the first issue of the combined journals to appear in July under the title of the Glass Packer.

Polished Plate Glass Production in May

The production of Polished Plate Glass in the United States for the month of May, 1931, was 9,465,658 sq. ft., as compared to 10,173,666 sq. ft. produced in the preceding month, April, 1931, and 12,571,414 sq. ft. produced in the corresponding month last year, May, 1930.

Ask Reduced Import Duties on Crude Feldspar

Commerce Reports of May 4 lists an application received April 23 from the Consolidated Feldspar Corporation, East Liverpool, O. for a decrease of duty on crude feldspar.

The proposed asbestos investigation requested by Asbestos, Ltd. (Inc.) of Millington, N. J. and the Amtorg Trading Corporation, New York has been postponed to a date to be announced later.

Weber-American Company

An announcement was recently made in Los Angeles that the American Woodworking Corporation of San Francisco and the Rogers Cabinet Manufacturing Company of Seattle had been acquired by the Weber Showcase and Fixture Company of Los Angeles. The name of the San Francisco organization will be changed to the Weber American Company, Limited, and the Seattle company to Weber Rogers Company, Inc.

New Construction Contracts

New construction contracts for the month of May amounted to $306,000,000, compared with April total of $336,925,200. Public works and utilities and non-residential buildings lead in the amount of construction contracts placed. The above figures are from the F. W. Dodge Corporation report for May.

Trade Practice Rules Adopted

The heavy sheet glass business is among 80 industrial groups which have adopted trade practice rules under the auspices of the Federal Trade Commission and the suggestion is made by the Commission that their acceptance within sixty days of June 3 be effected by each of the various trades.

Dupont Enlarging Buffalo Plant

The Dupont Cellophane Company, Inc., subsidiary of E. I. du Pont de Nemours Corporation recently announced that the company's plant at Buffalo would be enlarged at a cost of about $2,000,000. This company manufactures products used in the making of laminated glass.

Owens-Illinois Has Alameda Option

The City Council of Alameda, Cal., is considering re-zoning the Cohen estate to enable the Owens-Illinois Glass Company to erect a large glass factory on the property, 1435 acres of which the company has under option.

Trade Activities

The Quality Glass Company's plant at Van Voorhis near Morgantown, W. Va. began shipping their products on May 15.

The Interstate Window Glass Company's plant at Mt. Jewett which had been shut down has been taken over by a group of business men of that community. It is said that experimental operations will be carried on.

The Vitric Products Company, Oklahoma City, Okla., has been formed and will, it is reported, immediately begin construction work on a glass manufacturing plant which will produce 14 tons of finished products daily. F. P. Roehr is manager.

P. B. Sillimanite super refractories. Pyrometer protection tubes, glass house refractories: An illustrated booklet issued by the Charles Taylor Sons Company, manufacturers of fire brick, whose well-known factories are situated in Cincinnati, O., and Taylor, Ky. Copies are available upon request.

The Pittsburgh Plate Glass Company are aiding their employees at the Creighton, Pa., plant to put their spare time to good use by ploughing and preparing for planting a large tract of company land. Individual lots large enough for a good-sized garden are allotted to the workers. It is expected that many of the gardens will produce enough food to supply family tables for several weeks.

The Wellman Engineering Company, engineers, constructors and builders of the Wellman mechanical gas producer have issued bulletin No. 92 illustrating and describing this equipment. The principle on which their well known mechanical double-bell coal feed works is shown in a sectional view. Details of the mechanical poker and the work done by this device are given. Data on operating costs, etc., is given on producer gas economics for a glass factory. Open hearth steel works, and sheet steel mill, and other useful data on production of producer gas is tabulated.

Coming Meetings

American Glassware Manufacturers, Inc., will meet on July 13, 1931, at Atlantic City, N. J.

The Eastern Division, National Glass Distributors Association, will meet at Atlantic City September 24 and 25.

The Illuminating Engineers Society's 25th annual convention (celebrating its silver anniversary), Pittsburgh, Pa., October 13-16 inclusive, headquarters, William Penn Hotel.

American Bottlers of Carbonated Beverages, as announced by National Secretary, Junior Owens, Washington, D. C., will hold their annual convention and exposition at Dallas, Texas, Nov. 9-12.

Inquiries Received

For further information address THE GLASS INDUSTRY.

553. Please give us the names of concerns manufacturing glass silk.

554. We have a customer in the Orient who is interested in learning the names of concerns making covered flat glass dishes which are used for displaying pressed meat, salmon, ham and other meats in pieces. The dishes have a flat base with a quadrangular cover and are about 15 inches long.

555. We are interested in obtaining sources of frits for use in making mosaic glass.

What the World Wants

Specific Inquiries for American Goods Received in the Department of Commerce, Washington, D. C. For further information write the department.

India—52292. Glass bottles and jars, for packing fruit.
Porto Rico—51994. Glass bottles and corks for the drug trade.
Bahamas—51,957. Glassware, cheap grade.
Argentina—52102. Glass and glassware.
Belgium—52134. Glassware, china and pottery products.
Porto Rico—52147. Glassware, household.
Santo Domingo—51,735. Bulbs, electric automobile.
Yugoslavia—51,809. X-ray apparatus.
Canada—51,767. Quartz, ground, for match boxes.
Canada—51,778. Bottles, prescription, druggists.
Belgium—51,801. Glassware, scientific.

Readers Wants and Offers

Address answers to all "keyed" ads c/o The GLASS INDUSTRY 24 West 40th St., New York

ADDRESSES WANTED

Will the persons who inserted advertisements in the June issue keyed, respectively, JU-1, MY-2 and MY-3 kindly send their addresses to THE GLASS INDUSTRY, 24 West 40th St., New York.

Current Prices of Glass-Making Materials

June 23, 1931

Quotations furnished by various producers, manufacturers and dealers

	Carlots	Less Carlots
Acid		
Citric (dom.) lb.	.37	.36
Hydrochloric (HCl) 20° tanks, per 100 lb	..	1.10
Hydrofluoric (HF) 60% (lead carboy) lb	..	.13½
52% and 48% lb	.10	.10-.11½
Nitric (HNO_3) 38° carboy ext. Per 100 lb	5.50	..
Sulphuric (H_2SO_4) 66° tank cars ton	15.50	..
Tartaric lb	..	.31½
Alcohol, denatured gal	..	..
Aluminum hydrate ($Al(OH)_3$) lb	.04½-.05	.05½-.06
Aluminum oxide (Al_2O_3) lb	..	.07
Ammonium bifluoride (NH_4) FHF lb	..	.19
Ammonia water (NH_4OH) 26° drums lb	.02½	.02¾
Antimony, metallic (Sb) lb	..	.09⅝
Antimony oxide (Sb_2O_3) lb	..	.09⅝
Antimony sulphide (Sb_2S_3) lb	..	.14
Arsenic trioxide (As_2O_3) (dense white), 99% lb	.04	.04½
Barium carbonate ($BaCO_3$), Crude, (Witherite) 90%, 99% through 200 mesh ton	47.00	..
90% through 100 mesh ton	44.00	..
Barium hydrate ($Ba(OH)_2$) lb	..	.05¼
Barium mixture, glassmaker's, f.o.b. St. Louis ton	25.00	..
Barium nitrate ($Ba(NO_3)_2$) lb	..	.07¼
Barium selenite ($BaSeO_3$) lb	..	..
Barium sulphate, in bags ton	19.00	24.00
Barium sulphate, glassmaker's, carlots, bulk, f.o.b. shipping point, ton	15.00-16.00	18.00
Bone ash carlots, lb	.06	.06½
Borax ($Na_2B_4O_7 10H_2O$) lb	..	.0355-.0425
Crystal lb	.028-.033	..
Granulated lb	.025-.03	..
Powdered lb	.02875-.03375	..
Boric acid (H_3BO_3) lb	.0625-.07125	.0625-.08125
Refined lb	.0625-.07125	.07125-.08125
Cadmium sulphide (CdS)—		
Red lb	..	.65-.90
Orange lb	..	.65-.90
Yellow lb	..	1.30-1.50
Chromium oxide (Cr_2O_3) lb	.23	.24
Cobalt oxide (Co_2O_3)		
In bbls. lb	..	1.35-1.65
In 10 lb. tins lb	..	1.45
Copper oxide		
Red (Cu_2O) lb		.25
Black (CuO) lb	..	.17-.19
Black prepared lb	..	.22
Cryolite ($Na_3Al F_6$) Natural Greenland Kryolith) lb	.09	.09¼
Synthetic (Artificial) lb		.09..
Epsom salts ($MgSO_4$) (imported) Per 100 lb	..	1.15-1.20
*Feldspar—		
100 mesh ton	11.50-17.50	12.00-18.00
80 mesh ton	11.00-11.50	13.00
40 mesh ton	10.75-11.00	12.00
20 mesh ton	9.50- 9.75	10.00
Fluorspar (CaF_2) domestic, ground, 95-98% (max SiO_2, 2½%)		
Bulk, carloads, f.o.b. mines ton	30.00	..
In bags or barrels ton	34.00	39.00
Imported ton	36.50	38.50-40.00
Formaldehyde lb	..	.07
Graphite (C) lb	..	.04-.07
Iron oxide—		
Red (Fe_2O_3) lb	..	.0450
Black (FeO) lb	.04½	..
Kaolin (f.o.b. mine) ton	8.00-9.00	..
English, lump, f.o.b. New York ton	14.50-25.00	24.50-30.00

*Spot Shipments.

	Carlots	Less Carlots
Kryolith (see Cryolite)		
Lead chromate ($PbCrO_4$) lb		30
Lead oxide (Pb_3O_4) (red lead) lb	.06¼	.07¼
Litharge (PbO) lb	.05¼	.06¼
Lime—		
Hydrated ($Ca(OH)_2$) (in paper sacks) ton	7.00	7.00
Burnt (CaO) ground, in bulk ton	6.00	..
Burnt, ground, in paper sacks ton	8.00	8.00
Burnt, ground, in 280 lb. bbls. Per bbl	2.15	..
Limestone ($CaCO_3$)	1.75-2.50	1.75-2.50
Magnesia (MgO)—		
Calcined, heavy (in bbls.) lb	.06	.07
light (in bbls.) lb	..	.23
extra light (in bbls.) lb	..	.37
Magnesium carbonate ($MgCO_3$) lb	.06	.10
Manganese 85% (MnO_2) lb	.03	.03
Nickel oxide (Ni_2O_3), black— for nickel content lb	..	.35
Nickel monoxide (NiO), green— for nickel content lb	..	.35
Plaster of Paris, bags ton	21.00	23.00-29.00
Potassium bichromate ($K_2Cr_2O_7$)—		
Crystals lb	.09	.09¼
Ground lb	.11	.12
Potassium carbonate—94-96% lb	.0555	.0555
Calcined (K_2CO_3) 96-98% lb	.06½	.07¼
Hydrated 80-85% lb	.05¾	.06¼
Potassium chromate (K_2CrO_4) lb	..	.23-.32
Potassium hydrate (KOH) (caustic potash) lb	.07¼	.08
Potassium nitrate (KNO_3) (gran.) lb	..	.06½-.06¾
Potassium permanganate ($KMnO_4$) lb	.16	.17
Powdered blue lb	..	.195
Rochelle salts, bbls. lb	..	.19
Rouge lb	..	..
Rutile (TiO_2) powdered, 95% lb	.15-.20	.20-.25
Salt cake, glassmakers (Na_2SO_4) ton	22.00	..
Selenium (Se) lb	..	1.80
Silver nitrate ($AgNO_3$) (100 oz.) per oz	..	.21¼
Soda ash (Na_2CO_3) dense, 58%—		
Bulk, on contract Flat per 100 lb	1.07½	..
In barrels Per 100 lb	1.38	1.90-2.00
In bags Per 100 lb	1.17½	1.72½
Spot orders .. .025 per 100 lbs. higher	..	..
Sodium bichromate ($Na_2Cr_2O_7$) lb	.07	.07½
Sodium hydrate (NaOH) (caustic soda) Solid Per 100 lb	2.50	..
Sodium nitrate ($NaNO_3$)—		
Refined (gran.) in bbls. lb	.03⅞	.04½
95 per cent. Per 100 lb	2.01½-2.05	2.06½-2.10
Sodium selenite (Na_2SeO_3) lb	..	2.00
Sodium fluosilicate (Na_2SiF_6) lb	.04	.04½
Sodium uranate (Na_2UO_4) Yellow or Orange lb	..	1.50-1.55
Sulphur (S)—		
Flowers, in bbls. Per 100 lb	3.45	3.80-4.00
Flowers, in bags Per 100 lb	3.10	3.45-3.65
Flour, heavy in bbls. Per 100 lb	2.85	3.20-3.40
Tin chloride ($SnCl_2$) (crystals) lb	.37½	.39
Tin oxide (SnO_2) in bbls. lb	.28	.30-.35
Uranium oxide (UO_2) (black, 96% U_3O_8) 100 lb. lots. Black lb	..	2.75
Yellow lb	..	1.50
Zinc oxide (ZnO) lb	.08½	.12
American process. Bags lb	.06½	.07
Zircon		
Granular (Milled .005-.02c higher)	.07	.07½-.08
Crude. Gran. (Milled .005-.02c higher)	.03¼	.04-.05

Monthly Summary of United States Foreign Commerce in Glass

EXPORTS

Corrected to May 26, 1931.

	April 1930 Quantity	April 1930 Value	April 1931 Quantity	April 1931 Value	Four Months Ending April 1930 Quantity	Four Months Ending April 1930 Value	Four Months Ending April 1931 Quantity	Four Months Ending April 1931 Value
Glass and glass products (Total)	.....	$829,766	.....	$701,374	.....	$3,132,092	.....	$2,805,393
Plate and window glass—								
Window glass, common, box 50 sq. ft.	1,891	8,684	1,006	4,638	6,424	33,529	3,308	17,024
Plate glass, unsilvered, sq. ft.	430,645	127,349	458,927	140,866	1,062,200	339,577	1,683,887	514,677
Other window and plate glass lbs.	432,280	41,358	256,197	32,916	1,818,625	172,095	1,154,317	131,636
Glass containers (bottles, vials and jars)	.....	249,705	.....	193,930	.....	943,904	.....	780,690
Table glassware, plain	.....	117,460	.....	103,922	.....	439,063	.....	348,444
Table and other glassware, cut or engraved	.....	9,308	.....	7,034	.....	34,940	.....	26,102
Lamp chimneys and lantern globes lbs.	.....	19,926	.....	7,437	.....	74,174	.....	37,876
Globes and shades for lighting fixtures lbs.	.....	50,654	.....	37,177	.....	219,364	.....	159,606
Chemical glassware lbs.	16,463	17,044	12,331	11,572	78,065	72,289	49,974	49,988
Electrical glassware, except for lighting lbs.	717,952	30,683	107,753	5,619	1,951,760	123,592	499,596	37,526
Other glassware	.....	157,595	.....	156,263	.....	679,565	.....	702,424

IMPORTS

Corrected to May 26, 1931.

Glass and glass products	.....	$751,625	.....	$455,817	.....	$3,190,038	.....	$2,001,906
Cylinder, crown, and sheet—								
Plain dut. lb.	1,212,714	50,910	434,601	16,807	8,394,536	323,442	3,392,890	134,271
Bent, beveled, colored, etc. dut. lb.	.....	28,621	126,782	18,505	.....	136,660	734,240	94,396
Plate glass dut. sq. ft.	574,197	123,040	342,394	111,953	2,551,010	562,847	1,596,425	475,471
Glass mirrors	.....	.....	143	505	.....	.....	571	1,339
Rolled, cylinder, crown, and sheet glass, ground, obscured, bent, beveled, colored, etc.	.....	.....	.....	5,241	.....	.....	.....	16,669
Laminated glass and manufactures, and plated glass	.....	.....	.....	83	.....	.....	.....	3,799
Bottles, vials, jars, and other containers	.....	146,529	.....	36,766	.....	513,666	.....	178,707
Scientific articles and utensils dut.	.....	46,988	.....	37,896	.....	192,977	.....	122,985
Tubes and rods dut.	.....	.....	.....	8,962	.....	.....	.....	41,252
Illuminating articles dut.	.....	53,499	.....	32,201	.....	246,573	.....	126,873
Blown glass articles—								
Bulbs for electric lamps, without filament dut.	1,695,963	14,473	973,202	11,354	5,467,892	46,958	5,077,989	49,438
Other blown glass articles dut.	.....	173,876	.....	81,573	.....	717,556	.....	437,918
Pressed glass articles	.....	10,297	.....	10,144	.....	58,194	.....	46,047
Other glassware	.....	103,392	.....	83,827	.....	381,165	.....	272,741

No. 7

Carlots
30
.07¼
.06¼

00
00
-2.50

23
10
93

35
35
-29.00

9¼
2
555
7¼
6¼
2

8
6¾
7
5
9

.25

1¼

-2.00
½

½

¼
-2.10

½

-1.55

.00
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.40

5

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393

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536
590
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